

If the perineum is considered as the "inferior abdominal wall" with layers as definite and as important as the layers of the "superior (or anterior) abdominal wall," greatly improved results from surgery in this region are inevitable. A general surgeon would not close the "superior abdominal wall" without first identifying any approximately like structures, and yet, too frequently, a repair of the perineum is done by those who do not possess knowledge of even the essential anatomy of the region.

That faulty closure of the "superior abdominal wall" often results in incisional herniations is generally recognized; but obstetricians frequently fail to realize that faulty closure of the "inferior abdominal wall" almost invariably results in pelvic herniations such as rectoceles, cystoceles, urethroceles, and varying degrees of prolapse.

The layers that must be approximated may be summarized briefly as:

(1) Vaginal mucosa; (2) pelvic diaphragm; (3) urogenital diaphragm; and (4) skin.

When the bulbocavernosus muscles, which lie in the anterior compartment of the urogenital diaphragm, are approximated by the well-known "crown stitch," the result is a vaginal tone similar to that in a nulliparous woman.

The pudendal nerves are the chief source of muscular and cutaneous innervation in the perineum. These nerves readily lend themselves to local block due to their accessibility as they course through Alcock's Canal, which is on a level above the lower margin of the ischial tuberosities. The blocking of these nerves relaxes and anesthetizes the perineum, and is often used in conjunction with the infiltration method as described by Doctor Huff.

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HALL G. HOLDER, M. D. (1107 Medico-Dental Building, San Diego).—Modern obstetrics emphasizes episiotomy after elective low-forceps as proper procedure in primipara, in the best interests of mother and new-born. So widely has this teaching been accepted that it has become the rule rather than the exception. I will not labor this point, as I wish to indicate the value of this paper from a purely gynecological standpoint. The gynecologist sees all too many poorly done episiotomy repairs with associated perineal relaxation and subsequent gynecological sequelae. The statement has been made by older gynecologists that 60 per cent of gynecological surgery was incident to poor obstetrics and birth trauma. Episiotomy and elective low-forceps deliveries in particular were designed to avoid much of the sequelae of former years. Under proper management this is undoubtedly true; so we are indebted to Doctor Huff for his emphasis on episiotomy repair, the weak link in obtaining optimum results.

Episiotomy has been too lightly regarded as a most important operation, in fact, the most important in the conduct of the delivery, considering the future comfort and health of the mother. We, therefore, see many poorly executed and poorly repaired episiotomy incisions resulting in perineal relaxation comparable, or worse, than the results formerly obtained without its use and followed by the usual complications.

From a gynecological standpoint Doctor Huff's paper is timely in pointing very clearly to those employing episiotomy the necessity for accurate technique, if the best results are to be obtained and much subsequent morbidity avoided.

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DONALD G. TOLLEFSON, M. D. (511 South Bonnie Brae Street, Los Angeles).—Doctor Huff's presentation of the technique of mediolateral episiotomy calls our attention to a procedure which has been greatly neglected. It is an operation and should be performed as one.

The use of a scalpel has the advantage of a clean, sharp incision over the jagged irregular separation of tissue produced by a scissors. It allows better delineation of the various layers which permits a more accurate anatomical approximation. The elimination of external, nonabsorbable sutures might be criticized by those who feel that skin separation would be too apt to occur. This will seldom happen if asepsis is maintained and hemostasis is assured. The advantages as enumerated warrant the trial of this very complete, yet practical technique.

REGIONAL ANESTHESIA FOR ORTHOPEDIC OPERATIONS*

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DISCUSSION by Alfred Edward Gallant, M. D., Los Angeles; Hugh Jones, M. D., Los Angeles.

THE routine use of general anesthesia by orthopedic surgeons has been quite universal. This has been due in great part to lack of familiarity with regional technique and failure thereby to obtain complete anesthesia when operations have been attempted with regional block. We have no anesthetic agent or method that assures perfect results in every instance. In many orthopedic procedures regional anesthesia offers the patient greater safety and comfort during and after the operative procedure than can be obtained with any form of general anesthesia.

Three primary factors enter into the successful use of regional anesthesia:

1. Preliminary medication selected to meet the requirements of each case.
2. Potent, freshly made solutions of the anesthetic agent, of proper concentration.
3. Skillful blocking of the operative area.

PRELIMINARY MEDICATION

Preliminary medication plays an important part in the success or failure of any type of anesthesia. In regional anesthesia we try to give sufficient medication to allay nervousness and fear, but not enough to make the patient irresponsible and uncoöperative. To accomplish this the dosage must be selected for each patient. A combination of one of the barbituric acid derivatives and a narcotic will usually prove adequate. In some instances it has seemed advisable to give a hypodermic of morphin about one and a quarter hours prior to the injection, followed in about thirty minutes with a barbiturate. This gives us the advantage of the narcotic effect for the painful injection and allows the full effect of the hypnotic during the operation, when the patient is free from painful stimuli.

SOLUTIONS

Procain is our safest and best regional anesthetic agent. To avoid error and failure to obtain anesthesia due to injection of improper solution, it is advisable to prepare fresh solutions for each case. This is much more satisfactory than depending on novocain solutions prepared by some member of the surgical nursing staff, or by local pharmacists. By using 5 cubic centimeter sterile ampoules of 20 per cent novocain as put out by the larger pharmaceutical houses, this is a simple procedure. One of these ampoules diluted to 50 cubic centimeters with normal saline gives a 2 per cent solution, 100 cubic centimeters, 1 per cent, and 200 cubic centimeters, 0.5 per cent. Approximately

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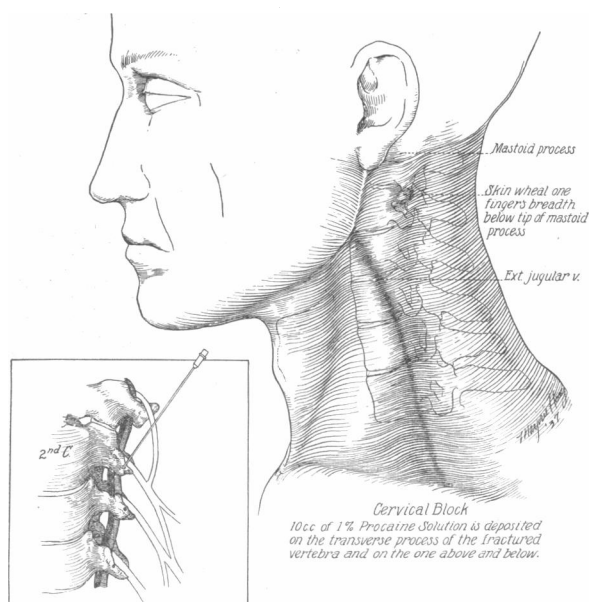


Fig. 1.—Deep and superficial landmarks for cervical block.

6 minims of adrenalin is added to each ampoule for its local vasoconstrictor action, except when the patient is suffering from a toxic thyroid condition, or severe myocardial damage. The solutions should be at about body temperature when injected. Warmer solutions produce anesthesia more rapidly than cold, due to a more rapid absorption; but the duration of the anesthesia will be reduced proportionately.

SKILLFUL BLOCKING

Patients are not capable of judging whether they have had a good or bad general anesthetic. When they remain conscious throughout the entire operative procedure, as they do with regional anesthesia, they are the best judges of the success or failure of the method. Most patients are willing to stand some discomfort during the injection. If the operative procedure following this is also painful, we cannot expect them to be enthusiastic boosters for the method.

The novocain solution should be deposited in close proximity to the nerves with as few needle punctures as possible. The anesthetist making the injection should be sufficiently familiar with the operative procedure to assure anesthesia of the entire operative field. Failure to have anesthesia of a very small area may result in the total failure of an otherwise satisfactory block.

CERVICAL PLEXUS BLOCK

The use of block anesthesia of the cervical plexus is limited in orthopedic surgery to laminectomy and the reduction of fractures or dislocations of the cervical vertebrae. It offers a greater margin of safety for the reduction of cervical fractures than any other type of anesthesia. With the patient conscious and able to cooperate, it is possible for the surgeon to tell immediately if he should overcorrect the deformity and cause compression of the cord where none existed previously. For this pro-

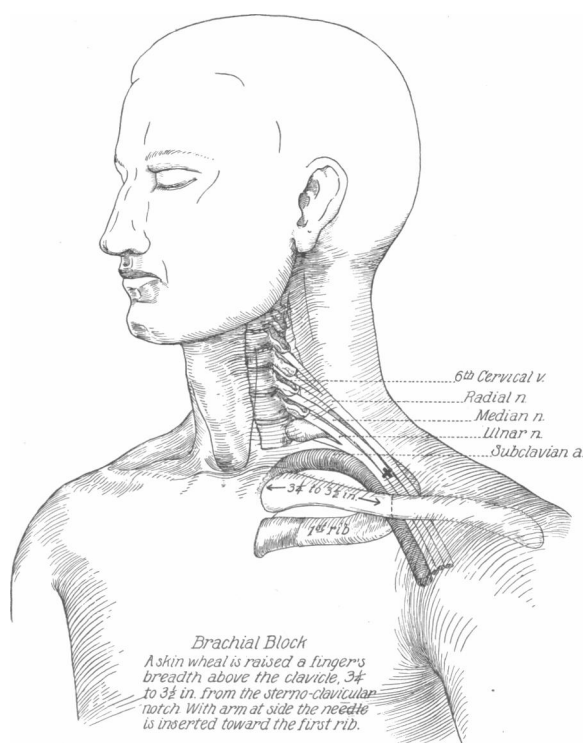


Fig. 2.—Position of clavicle and first rib in relation to brachial plexus.

cedure 10 cubic centimeters of 1 per cent novocain is deposited on the transverse processes of the fractured vertebrae and of the one above and below. The method of approach to the processes is determined by the location of the fracture and the patient's condition. Whenever possible the lateral approach as described by Labat is the one of choice. (Fig. 1.) If the sixth or seventh cervical vertebrae are involved, they may be approached from either the lateral or posterior position. In the posterior position a technique similar to paravertebral block in the upper thoracic region is used.

OPERATIVE PROCEDURES ON THE ARM

Regional anesthesia is the method of choice for long operative procedures on the arm. Anesthetic shock for long operations is reduced to a minimum, and when the injection is made correctly, the operative procedure is painless. It is particularly indicated for emergency traumatic surgery, as there is always an increased risk in administering an inhalation anesthetic to a patient that has not been properly prepared and premedicated.

Of the regional procedures that may be used on the arm, this discussion will be limited to brachial plexus block; although, for some cases, blocking of the nerves at the elbow or wrist may be sufficient. Brachial plexus block gives complete anesthesia of the entire forearm; if anesthesia of the shoulder, or upper arm, is desired, it can be obtained by placing a superficial injection around the shoulder, or upper arm, as indicated. The anesthesia obtained will ordinarily last for one and one-half hours from the completion of the injection. If the need for a longer period of an-

esthesia is anticipated, the needles may be left in place and additional novocain added as necessary. By this means anesthesia has been maintained for tendon repair for over four hours.

The technique for brachial plexus block is one of the easiest of our regional procedures, if one will keep in mind the important anatomical structures. The chief difficulty is encountered in accurately locating the mid-point of the clavicle, and in depositing the solution at the proper depth. If it is possible to palpate the subclavian artery, this difficulty is immediately overcome, as the injection can be made just lateral to it. The sternoclavicular junction can always be palpated easily; and if a wheal is raised a finger's breadth above the clavicle, three and a quarter to three and a half inches from the sternoclavicular articulation, this will practically always be over the plexus. The patient's arm should be at the side, and not extended on an arm board. (Fig. 2.) The needle is then inserted toward the first rib. If paresthesia is obtained to the hand, the injection is made immediately. By keeping in mind the relationship of the nerve trunks, it is easy to decide whether to move the needle inward or outward from the midline, as the ulnar trunk lies closest to the artery. Thus, if paresthesia is obtained to the thumb and forefinger, the next needle is inserted slightly closer the midline for the ulnar branch. If no paresthesia is obtained, the needle is withdrawn about one centimeter from the rib and the 2 per cent procain solution is deposited at that level. From 20 to 30 cubic centimeters of solution placed at the proper depth will spread over quite an area, so that paresthesias are not essential for obtaining complete anesthesia.

In a series of forty brachial blocks during the past three years, one was for open reduction of the clavicle, one for shoulder operation, one for Dupuytren's contracture, and the rest were for open or closed reductions of fractures of the upper or forearm and tendon sutures. In one instance where an open reduction at the elbow was done, a second operation became necessary and the patient requested this type of anesthesia. Satisfactory anesthesia was obtained in all of these patients for one and one-half hours, except in the case of one closed reduction, and that patient's fracture was reduced without the use of general anesthesia.

PARAVERTEBRAL BLOCK

Paravertebral block is a method to be considered for laminectomies for any purpose, and for Hibbs and Albee operations in particular. When used for the Albee operation, it is also necessary to block an area over the tibia for removal of the bone graft. Due to the restriction of breathing when it is necessary to operate upon patients lying on their face, our choice really lies between general anesthesia, using the intratracheal technique, and regional anesthesia. Considering the safety of the patient during the operative procedure, regional anesthesia is the method of choice. The dangers of postoperative anesthesia complications are also greatly reduced.

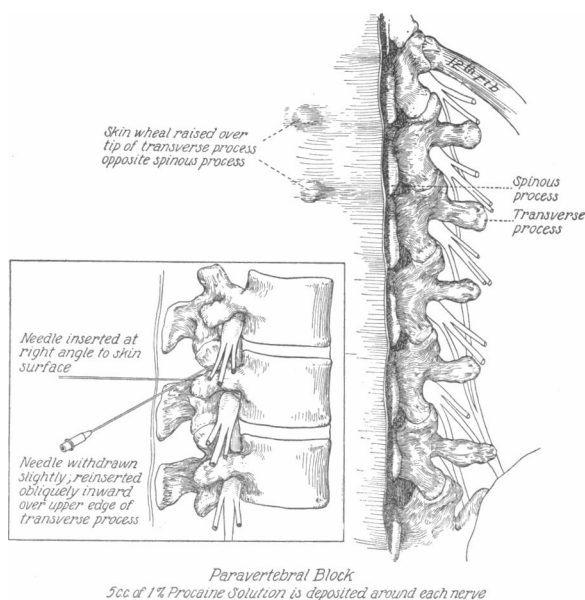


Fig. 3.—Superficial and deep landmarks for paravertebral block in the lumbar region.

The technique of paravertebral block varies slightly, according to the area involved. In the lumbar region the transverse processes lie directly opposite the interspinous notch, and the skin wheal is raised at this point about an inch from the midline. (Fig. 3.) As we ascend the vertebral column, the wheals are raised about an inch from the midline, but higher in relation to the notch until, in the upper thoracic, they are raised opposite the spinous process itself.

The needle is first inserted at right angles to the skin until it makes contact with the transverse process. It is then withdrawn and reinserted, inward and upward over the edge of the transverse process. Approximately 5 cubic centimeters of 1 per cent novocain is injected around each nerve. The line of incision may then be infiltrated with .5 per cent procain as an adjunct to the anesthetic, and to promote hemostasis. This procedure is not essential, and if there is any contraindication it may well be omitted.

Paravertebral block is also of value in the reduction of vertebral fractures, and has the same advantages as cervical block for this purpose.

CONCLUSIONS

Regional anesthesia offers the patient greater safety for the orthopedic procedures enumerated than general anesthesia.

The dangers of postoperative pulmonary complications are eliminated, except those that are embolic in origin.

When the novocain solution is placed properly, operative procedures may be performed without pain.

Anesthetic and operative shock are reduced to a minimum.

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DISCUSSION

ALFRED EDWARD GALLANT, M.D. (727 West Seventh Street, Los Angeles).—Doctor McCuskey's paper offers a very interesting phase of anesthesia for orthopedic operations, and a practical application of what he has stated and outlined is of much value because it allows the surgeon a better facility for performing his work. It has been found that regional anesthesia minimizes the possibility of shock, especially in those cases which are bad risks. In the past four years we have employed this method in about thirty cases in which Doctor McCuskey provided the anesthesia technique. To cite a few of these cases, a woman who had both bones of the left forearm fractured and a fracture of the left patella, regional anesthesia was given, under brachial block for the correction of the forearm fractures, and a femoral block for the patella fracture. There had been a head injury in this case, and I am of the opinion that an ether anesthesia would not have been a satisfactory method. The use of the regional blocks proved to be of much advantage. A second instance, a man with a spiral fracture of the humerus, brachial block was employed. This man had been a heavy drinker, and it was certain that recumbency, if the Bardenhauer method had been employed, would not have been satisfactory. The regional block allowed us to apply a shoulder spica and the patient became ambulatory. Another instance of a comminuted spiral fracture of the right humerus in a young woman where a head injury had also existed, made a satisfactory handling of the case a relatively simple procedure. A spiral fracture of the shaft of the humerus in a woman over eighty years of age was satisfactorily reduced. Patient was allowed to become ambulatory, and much more comfortable than in cases where there were recumbency and extension. Another instance, a man of eighty-four years of age with fractures of both tibiae, and right humerus, involving the elbow joint, a very bad risk and treated with regional anesthesia, resulted in satisfactory reduction and outcome. Therefore, I am of the opinion that regional anesthesia will gradually become more universally used because of its possibilities in orthopedic problems.

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HUGH JONES, M.D. (201 Medical Office Building, Los Angeles).—More extensive use of regional anesthesia in orthopedic operations will probably come about as anesthesiologists perfect the technique to the point where the surgeon and patient can confidently expect a painless operative procedure. The surgeon himself may be able to acquire this skill; but in general it is better to trust this work to an anesthetist whose experience is such that satisfactory anesthesia can be counted upon regularly.

The cervical plexus block for manipulating fractures of the cervical spine has been very comforting to me, because I have felt very uneasy about assuming the responsibility in such a case, with the weight of the head and relaxed neck as it hangs with the helpless patient under general anesthesia.

The brachial plexus block has been very helpful, indeed, for time-consuming tendon and nerve repair. A particular advantage is usually found in the ability of the patient to contract the various muscles, and this helps in the identification of the different tendons. This voluntary control is also appreciated when it is possible to try out the return of function before closing the wound. Leaving the needle in place to reinforce waning anesthesia, is an advantage easily appreciated.

More frequent use of paravertebral anesthesia should be made in the Hibbs and Albee operations, as well as for laminectomy. For the Albee operation, the leg can well be anesthetized by surrounding the operative site for the removal of the graft from the shin.

In emergency work one feels much safer about a patient with a full stomach, if the dangers incident to vomiting while under the anesthetic can be avoided. Local anesthesia provides this factor of safety.

COMPENSATORY PRESSURE IN ANESTHESIA FOR THORACIC SURGERY*

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OCCASIONALLY, during the task of administering an anesthetic one is confronted by a sudden crisis which threatens the safety of the patient, disturbs the surgeon, and chills the spine of the anesthetist. At a time such as this it is essential to analyze the situation promptly and to institute the proper corrective measures. This is especially true when seemingly indicated readjustments in the anesthetic fail to produce the desired result.

Such a sudden crisis may occur during operations upon the thorax which necessitate the opening of a hole of any considerable size in the chest wall. The following is somewhat the order of the train of events as they take place:

A patient under nitrous oxid anesthesia, reinforced by local infiltration, chloroform, cyclopropane or intravenous barbiturates, may be breathing quite evenly and showing no signs of either anoxemia or overdosage of anesthesia. When the thorax is opened, however, the respiratory rate increases, the depth of breathing increases, the pulse rate and pulse volume increase and cyanosis appears. An increase of the oxygen flow to the patient is the first consideration, and is promptly provided. The desired evidence of oxygenation does not result. Cyanosis becomes deeper and asphyxial spasm begins to manifest itself. The pulse becomes more rapid and more feeble. The pupils dilate and the skin becomes mottled. Suddenly, just at the moment when oxygen in the lungs is of the utmost importance, the anesthetist is confronted with the most distressing of all conditions in inhalation anesthesia, *i. e.*, spasm of the glottis and of the respiratory muscles. That death does not more often supervene is undoubtedly due to the fact that, after the fatigue of the prolonged asphyxial spasm, a sufficient relaxation of the glottis occurs to permit the anesthetist to force a small amount of oxygen into the lungs under pressure, and the patient revives with evidence of considerable shock. The abruptness with which the foregoing disturbance breaks into the course of the anesthesia is probably the reason why deaths at this point have been variously ascribed to embolism, acute dilatation of the heart, shock, collapse of the trachea, or status lymphaticus.

Convinced that the foregoing syndrome was, in most cases, due entirely to oxygen-want carried to the stage of asphyxia, I began to use increased pressure in the breathing bag promptly at the time the chest wall was opened, or when its rigid structure was disturbed by a resection of the ribs. The result of maintaining pressure during this period of the operation is so gratifying that I feel the subject is worthy of emphasis before this group.

* Read before the Anesthesiology Section of the California Medical Association at the sixty-sixth annual session, Del Monte, May 2-6, 1937.